

REMARKS/ARGUMENTS

I. Status of Claims

Claims 1-81 are pending in the application. Applicants respectfully points out to the Examiner that the subject application as originally filed contains 81 claims as opposed to 80 claims.

Claims 46-52 are withdrawn from consideration.

Claims 1-45 and 53-81 are rejected.

II. Election/Restriction

In response to Examiner's restriction requirement as outlined on page 2 in the January 4, 2005 Office Action, an election to prosecute the invention in Group I, Claims 1-45 and 53-81 is made with traverse.

III. Claim Rejections -- 35 U.S.C. §102 (Macdonald)

Claims 1, 7, 9-13, 15-17, 24, 37, 40-45, 53, 62, 64, 65 stand rejected under 35 U.S.C. §102(b) as being anticipated by Macdonald (USPN 5,695,155) hereinafter referred to as **Macdonald**.

A rejection under 35 U.S.C. §102 must contain every element recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim. MPEP §2131 provides:

A claim is anticipated only if each and every element as set forth in the claim is found,

either expressly or inherently described in a single prior art reference. *Verdegall Bros. v. Union Oil Co. Of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

“The identical invention must be shown in as complete detail as is contained in the . . . claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim.

The Applicant respectfully argues that because from the facts derived from the reference, as set forth below, the cited reference does not contain every element recited in the rejected claims either expressly or inherently described and in as complete detail as is contained in the amended claims and arranged as recited in the amended claims. Thus, the Applicants respectfully request reconsideration of the rejection in light of the amendments for the following reasons.

First, Applicants have amended independent Claims 1 and 53 accordingly to remove the rejection to these claims and associated dependent claims 7, 9-13, 15-17, 24, 62, 64, and 65. Although not necessary to remove the rejection, some of these dependent claims are amended in a way that further distinguishes **Macdonald**. Note that ice is not a porous material as per Claims 15 and 16 so **Macdonald** does not show this feature as suggested in the Office Action.

Second, with respect to Claim 1, the Applicants have amended Claim 1 to include a limitation wherein at least one of the measurement cells must be integrally formed within said transmission line. Further, Claim 1 has been amended to include a limitation wherein said at least one of said plurality of measurement cells must necessarily be present for continuity of said transmission line and for transmission of said microwave signal during operation of said instrument. Still further, Claim 1 has been amended to include a negative limitation wherein the Applicants’ instrument is not based on the condition of resonance. In comparison, it is clear in

Macdonald's FIGS. 1, 2, 3, 5, and 8, that his measurement cell or resonator (28A-28N) is not integrally formed within his transmission line (24). In fact, contrary to the Examiner's statement (ref: Jan. 4, 2005 Office Action, page 3, paragraph 4), **Macdonald**'s resonators are not formed in his transmission line at all. Perhaps the Examiner misinterpreted **Macdonald**'s statement that his sensor includes a microstrip transmission line (ref: '155, Col. 3, lines 23-24). However, **Macdonald**'s sensor is not equivalent with his measurement cell or resonator. Rather, **Macdonald**'s sensor is his entire instrument. **Macdonald** forms his measurement cell or resonator by a microstrip signal line in a closed loop configuration, preferably a circle (ref: '155, Col. 3, lines 38-39; FIG. 1). **Macdonald**'s resonator is spaced along his transmission line (ref: '155, Col. 5, lines 3-4), but is not formed in his transmission line. The Applicants point the Examiner to **Macdonald**'s FIG. 5, which illustrates the separate nature between **Macdonald**'s measurement cell or resonator and his transmission line the best. Thus, **Macdonald** does not anticipate Claim 1 because **Macdonald** does not expressly or inherently describe a measurement cell formed within a transmission line. Further **Macdonald** is based on the condition of resonance and Applicants' instrument is not based on the condition of resonance. Because **Macdonald** does not anticipate Claim 1, **Macdonald** cannot anticipate Claims 40-45, which depend on Claim 37.

Third, with respect to Claim 37, Applicants have amended Claim 37 to include a detector being operable for measuring a phase angle and utilizing said phase angle for at least one of either determining the thickness of said one or more superstrate or for distinguishing between predetermined superstrates. In contrast, **Macdonald** uses amplitude of the signal in the detection process (ref: '155, Abstract, line 6; Claims 1, 8, 17; Col. 2, line 21; FIG. 4; Col. 6, line 16). In fact, a word search in **Macdonald** for "phase" yielded no matches. Thus, **Macdonald** does not

anticipate Claim 37 because **Macdonald** does not expressly or inherently describe the use of phase angles in his detection process.

Fourth, with respect to Claim 53, Applicants have amended Claim 53 to include a limitation such that said plurality of measurement cells are integrally formed within said transmission line. Further, Claim 53 has been amended to include a negative limitation wherein the Applicants' method is not based on the condition of resonance. In sum, the same arguments used to distinguish Claim 1 from **Macdonald** are incorporated by reference with respect to Claim 53 and will not be repeated. Thus, **Macdonald** does not anticipate Claim 53 because **Macdonald** does not expressly or inherently describe a measurement cell formed within a transmission line and because Applicants' method is not based on the condition of resonance. Because **Macdonald** does not anticipate Claim 1, **Macdonald** cannot anticipate Claims 62 and 64-65, which depend on Claim 37.

Accordingly, Applicants respectfully traverse and request reconsideration of the rejection under 35 U.S.C §102 based on **Macdonald**.

IV. Claim Rejections -- 35 U.S.C. §102 (Joshi)

Claims 25 and 35 stand rejected under 35 U.S.C. §102(e) as being anticipated by Joshi, et al. (USPN 6,407,555) hereinafter referred to as **Joshi**, for the following reasons.

First, **Joshi**'s sensor is based on the condition of resonance (ref: '555, Abstract, lines 2-9). Specifically, **Joshi**'s sensor is dependent on detection of a change in quality (Q) factor and a frequency shift in a resonator (ref: '555, Col. 7, lines 59-62). Claim 25 has been amended to include a negative limitation wherein said waveguide sensor is not based on the condition of resonance for detecting said one or more superstrates. Thus, Claim 25 does not anticipate **Joshi**

because **Joshi** relies on the condition of resonance and Claim 25 expressly negates a sensor based on the condition of resonance. Because **Joshi** does not anticipate Claim 25, **Joshi** cannot anticipate Claim 35, which depends on Claim 25.

Second, although not necessary to remove the rejection to dependent Claim 35, Claim 35 is amended in a manner that further distinguishes **Joshi** by providing that the spacings are open to receive fluid as per one possible embodiment of the invention. **Joshi** utilizes a protective coating to seal the openings and avoid entrance of material into the openings (see '555, FIG. 9). Applicants' design for use in the embodiment when the spacings are open permits a very thin layer of ice to be detected, whereas **Joshi** has no interest in detecting thin layers (see the subject application, FIG. 12). Thus, **Joshi** does not anticipate Claim 35 for the aforementioned rationale as well as the rationale provided in the previous paragraph.

Accordingly, Applicants respectfully traverse and request reconsideration of the rejection under 35 U.S.C §102 based on **Joshi**.

V. Claim Rejections -- 35 U.S.C. §103 (Macdonald in view of Joshi)

Claims 2, 8, 23, 36, 38, and 39 stand rejected under 35 U.S.C. §103(a) as being unpatentable over **Macdonald** in view of **Joshi**. The Applicants respectfully traverse this rejection for the following reasons.

All Claim Limitations Must be Considered

The references do not teach or suggest all the claim limitations in the amended claims. When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. MPEP §2143.03 states:

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.

Because from the facts derived from the references, as set forth below, the references do not teach or suggest all of the claim limitations per the amended claims, and thus, the Applicant respectfully requests reconsideration of the rejection in light of the amendments.

First, Claims 2, 8, and 23 all depend from Claim 1. As stated *supra*, Claim 1 has been amended to add a negative limitation wherein the instrument is not based on the condition of resonance. Both **Macdonald** and **Joshi** depend on resonators to change the resonant frequency of a reflected signal influenced by the presence of ice (in the case of Macdonald) and moisture (in the case of Joshi) (ref: '155, Col. 4, lines 29-37 and '555, Col. 8, lines 44-48). Therefore, **Macdonald** and **Joshi** in combination do not teach or suggest all of the limitations of amended Claim 1 and a *prima facie* case of obviousness does not exist.

Second, Claims 36, 38, and 39 all depend on Claim 25. Claim 25 has also been amended to include a limitation wherein the waveguide sensor is not based on the condition of resonance. As stated *supra*, both **Macdonald** and **Joshi** depend on the condition of resonance. Therefore, **Macdonald** and **Joshi** in combination do not teach or suggest all of the limitations of amended Claim 25 and a *prima facie* case of obviousness does not exist.

Accordingly the rejection to Claims 2, 8, 23, 36, 38, and 39 under 35 U.S.C. §103(a) is respectfully traversed.

VI. Claim Rejections -- 35 U.S.C. §103 (Macdonald in view of Stolarczyk)

Claims 14, 18-22, 56-61, and 63 stand rejected under 35 U.S.C. §103(a) as being unpatentable over **Macdonald** in view of Stolarczyk et al. (USPN 5,474,261) hereinafter referred

to as **Stolarczyk**. The Applicants respectfully traverse this rejection for the following reasons.

All Claim Limitations Must be Considered

The references do not teach or suggest all the claim limitations in the amended claims. Simply stated, as with the arguments made in Section V of this Amendment, both **Macdonald** and **Stolarczyk** are based on the condition of resonance. Because from the facts derived from the references, as set forth below, the references do not teach or suggest all of the claim limitations per the amended claims, and thus, the Applicant respectfully requests reconsideration of the rejection in light of the amendments.

First, as with **Macdonald** (discussed *supra*), **Stolarczyk** is also based on the condition of resonance (ref: Col. 4, lines 52-55; Col. 6, lines 18-23). Claims 14, and 18-22 are dependent on Claim 1. Claim 1 has been amended to add a negative limitation wherein the instrument is not based on the condition of resonance. Therefore, **Macdonald** and **Stolarczyk** in combination do not teach or suggest all of the limitations of amended Claim 1 and a *prima facie* case of obviousness does not exist.

Second, Claims 56-61 and 63 are all dependent on Claim 53. Claim 53 has been amended to add a negative limitation wherein said method is not based on the condition of resonance. As stated supra, both **Macdonald** and **Stolarczyk** base their apparatuses and methods of use on the condition of resonance. Therefore, **Macdonald** and **Stolarczyk** in combination do not teach or suggest all of the limitations of amended Claim 1 and a *prima facie* case of obviousness does not exist.

Accordingly the rejection to Claims 14, 18-22, 56-61, and 63 under 35 U.S.C. §103(a) is respectfully traversed.

VII. Claim Rejections -- 35 U.S.C. §103 (Macdonald in view of Misra)

Claims 54, 55, and 66-75 stand rejected under 35 U.S.C. §103(a) as being unpatentable over **Macdonald** in view of **Misra** (USPN 5,233,306) hereinafter referred to as **Misra**. The Applicants respectfully traverse this rejection for the following reasons.

VII.A All Claim Limitations Must be Considered

The references do not teach or suggest all the claim limitations in the amended claims. Because from the facts derived from the references, as set forth below, the references do not teach or suggest all of the claim limitations per the amended claims, and thus, the Applicant respectfully requests reconsideration of the rejection in light of the amendments.

First, Claims 54, and 55 depend on Claim 53. Applicants respectfully point the Examiner to the limitation in Claim 53, which states, “applying a signal to said transmission line such that said signal is applied through each of said measurement cells.” (emphasis added) Thus, in the Applicants’ method, a signal is sent from a generator and transmitted through the measurement cells. It is the signal which “comes out of” the measurement cells that is used as a comparison basis with the reflected signals from the measurement cells (ref: page 56, lines 3-6; page 56-59). Conversely, **Misra** doesn’t use measurement cells. Rather, **Misra** applies an incident signal to a sample. The incident signal is reflected by the sample and thus, creates a reflected signal. (ref: ‘306, Col. 5, lines 2-16). Thus, **Misra** doesn’t apply a signal through a plurality of measurement cells. **Macdonald**, on the other hand, does teach the use of measurement cells in the form of resonators. However, as discussed supra, **Macdonald**’s resonators are separate from his transmission line. Thus, **Macdonald**’s method involves applying a signal through the

transmission line (not through the resonators), wherein the signal is reflected back by the open circuit of the transmission line, and wherein the reflected signal now passes through the resonator (ref: '155, Col. 3, lines 50-56). Neither **Macdonald** nor **Misra** teach or suggest applying a transmitted (versus reflected) signal through a plurality of measurement cells. Therefore, **Macdonald** and **Misra** in combination do not teach or suggest all of the limitations of amended Claim 53 and a *prima facie* case of obviousness does not exist.

Second, Claims 67-75 are dependent on Claim 66. Applicants have amended Claim 66 to add the following limitations: wherein said waveguide is comprised of covered and uncovered sections, and wherein said measurement positions are comprised of said uncovered sections of said waveguide. As discussed *supra*, **Misra** does not teach or suggest the use of measurement positions and certainly not a waveguide comprised of uncovered and covered sections.

Macdonald does teach a waveguide in the form of a microstrip transmission line (ref: '155, Col. 3, lines 23-24). However, in lieu of the current amendments to Claim 66, **Macdonald** does not teach a waveguide comprised of covered and uncovered sections wherein the measurement positions are comprised of said uncovered sections. As stated *supra*, **Macdonald** teaches the use of resonators separated from the microstrip transmission line (or waveguide). Further, **Macdonald**'s resonators are covered or more specifically, environmentally protected by a superstrate material (ref: '155, Col. 3, lines 32-37). Neither **Macdonald** nor **Misra** teach or suggest the amended limitations. Therefore, **Macdonald** and **Misra** in combination do not teach or suggest all of the limitations of amended Claim 66 and a *prima facie* case of obviousness does not exist.

VII.B References are not Properly Combinable or Modifiable if the Primary Reference's Intended Function is Destroyed

The combination or modification of the references in the manner suggested by the examiner would render the primary reference inoperable for its intended purpose. MPEP §2143.01 states:

If [the] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

Because from the facts derived from the references, as set forth below, the suggested combination or modification would render the primary reference inoperable for its intended purpose, the rejection is unsupported by the art and should be withdrawn.

A review of the **Misra** background discussion states that the **Misra** apparatus and method is only suitable for use with an open-ended coaxial line (ref: '306, Col. 2, line 67 through Col. 3, line 2). **Misra** does not teach or suggest multiple embodiments for his “probe” or coaxial line (ref: '306, Col. 5, lines 31-42). Evaluating **Misra**’s formulas, it becomes apparent that his mathematical basis is dependent on the use of a coaxial line (ref: '306, Col. 8, lines 60-62). Evaluating **Misra**’s independent claims, all of said claims include the limitation of a coaxial probe (ref: '306, Claims 1, 3, 4, 8, and 11). In contrast, **Macdonald** requires a thin aerodynamic profile and hence teaches the use of a microstrip transmission line (ref: '155, Col. 3, lines 23-24). **Macdonald** does not teach or suggest the use of a coaxial line as a transmission line (a word search of **Macdonald** for “coax\$” resulted in no results). Thus, the use of a coaxial transmission line would render **Macdonald**’s invention inoperable for its intended purpose.

Therefore, the Applicants traverse the Examiner’s rejections and respectfully argue that a *prima facie* case of obviousness has not been established.

VII.C There Must be a Basis in the Art for Combining or Modifying References

There must be a basis in the art for combining or modifying the references. MPEP §2143.01 provides:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggest the desirability of the combination.

Accordingly, even if all the elements of a claim are disclosed in various prior art references, the claimed invention taken as a whole cannot be said to be obvious without some logical reason given in the prior art why one of ordinary skill would have been prompted to combine the teachings of the references to arrive at the claimed invention. The Applicants submit the following comments and arguments.

Upon first reading of **Macdonald** and **Misra**, both inventions are sensors. However, **Macdonald**'s invention is designed to detect ice (a known element) or no ice (i.e., air, also a known element) and **Misra**'s invention is designed to determine the permittivity of an unknown sample. The Examiner states that it would be obvious for one skilled in the art to include an estimated data vector into **Macdonald**'s for the purposes of providing real time measurements of complex permittivities (ref: January 4, 2005 Office Action, page 7, lines 16-18). The underlying question is: why would **Macdonald** want real time measurements of complex permittivities, when **Macdonald** is concerned with detecting ice or no ice and thus, knows the permittivity of ice and air? (ref: see discussion in '155, Col. 4, lines 10-27) In short, **Misra** does not contain a suggestion or motivation for utilizing his invention for samples wherein the permittivity is known. Conversely, **Macdonald** does not contain a suggestion or motivation for detecting samples of unknown permittivity. Thus, there is no suggestion or motivation for combining

Macdonald and Misra.

Therefore, the Applicants traverse the Examiner's rejections and respectfully argue that a *prima facie* case of obviousness has not been established.

VIII. Claim Rejections -- 35 U.S.C. §103 (Macdonald in view of Joshi and in further view of Rose)

Claims 3-6, 26-34, and 76-80 stand rejected under 35 U.S.C. §103(a) as being unpatentable over **Macdonald** in view of **Joshi** and in further view of **Rose**, et al. (USPN 5,629,485) hereinafter referred to as **Rose**. The Applicants respectfully traverse this rejection for the following reasons.

VIII.A All Claim Limitations Must be Considered

The references do not teach or suggest all the claim limitations in the amended claims. Because from the facts derived from the references, as set forth below, the references do not teach or suggest all of the claim limitations per the amended claims, and thus, the Applicant respectfully requests reconsideration of the rejection in light of the amendments.

First, Claims 3-6 are dependent on Claim 1. As discussed *supra*, Claim 1 has been amended to add a negative limitation wherein the Applicants' instrument is not based on the condition of resonance. As discussed *supra*, it has been established that **Macdonald** and **Joshi**'s inventions are based on the condition of resonance. **Rose**'s invention is also based on the condition of resonance (ref: '485, Claims 1, 10, 17; Abstract, lines 1-5; Col. 1, lines 4-8). In short, neither **Macdonald**, **Joshi**, nor **Rose** teach or suggest the amended limitation. Therefore, **Macdonald**, **Joshi**, and **Rose** in combination do not teach or suggest all of the limitations of

amended Claim 1 and hence, Claims 3-6 through dependency, and a *prima facie* case of obviousness does not exist.

Second, Claims 26-34 are dependent on Claim 25. As discussed *supra*, Claim 25 has been amended to add a negative limitation wherein said waveguide sensor is not based on the condition of resonance for detecting said one or more superstrates. Therefore, **Macdonald, Joshi, and Rose** in combination do not teach or suggest all of the limitations of amended Claim 25 and hence, Claims 26-34 through dependency, and a *prima facie* case of obviousness does not exist.

Third, Claims 77-81 are dependent on Claim 76. Claim 77 is cancelled. Claim 76 has been amended to add the following limitations: one or more non-measuring cells formed integrally with and along said one or more elongate transmission lines wherein said one or more non-measuring cells is covered by a predetermined material; one or more measuring cells formed integrally with and along said one or more elongate transmission lines such that at least one of said one or more measurement cells must necessarily be present for continuity of said transmission line and wherein said one or more measuring cells is exposed to said external environment (emphasis added). As discussed *supra*, **Macdonald's** measurement cells or resonators are environmentally protected by a predetermined superstrate (ref: '155, Col. 3, lines 32-36). Further, **Joshi's** probe is embedded in a protective coating (ref: '555, Col. 7, lines 10-14; FIG. 7, Col. 7, lines 66-67). Upon first blush, it may seem that **Joshi's** FIG. 12 does not show a protective coating over the stripline. However, upon reading **Joshi's** description of FIG. 12, it is apparent that **Joshi's** intends that a protective coating surrounds his asymmetric stripline (ref: '555, Col. 6, lines 4-5). In fact, in all of **Joshi's** embodiments, **Joshi** protects his probe component with a protective coating (ref: '555, Col. 5, line 46; Col. 5, line 50; Col. 5, line 55;

Col. 5, line 58; Col. 5 line 67; Col. 6, line 5, Col. 6, lines 10-11; and Col. 6, lines 22-23). With **Rose**, **Rose** is an acoustic system and does not teach or suggest measurement cells in the same manner as in Claim 76. **Rose** uses an ultrasonic waveform transducer (ref: '485, Col. 4, lines 58-59) as his "probe." In short, **Rose** does not teach or suggest using a probe that is exposed to an external environment. Therefore, **Macdonald, Joshi**, and **Rose** in combination do not teach or suggest all of the limitations of amended Claim 76 and hence, Claims 78-81 through dependency, and a *prima facie* case of obviousness does not exist.

IX. Listing of Claim Amendments and Support in the Specification

Claim 1. Support for the amendments in Claim 1 can be found on page 19, lines 2-8. Further, resonance is only mentioned to describe what is in the prior art and is not discussed in any part of the Specification that describes the Applicant's apparatus and multiple embodiments thereof. It is clear by reading the Specification that the Applicant's apparatus and multiple embodiments thereof is not based on the condition of resonance.

Claim 9. Support for the amendment in Claim 9 can be found on page 46, line 17 of the Applicants' specification.

Claim 25. As discussed *supra*, support for the amendment in Claim 25 can be found in the fact that there is no mention of the use of the condition of resonance in Applicants' apparatus and multiple embodiments thereof. Further, upon reading the Applicants' methodology, it is clear that the condition of resonance is not relied upon.

Claims 31-34. Support for the amendments in Claims 31-34 can be found on page 19, lines 2-8 and are made for clarification purposes.

Claim 35. Support for the amendment in Claim 31 is made for clarification purposes and can be found in FIG. 12 and page 46, line 18 though page 47, line 2.

Claim 37. Support for the amendment in Claim 37 can be found on page 47, line 13.

Claim 38. Support for the amendment in Claim 38 can be found on page 19, lines 2-8.

Claim 44. This amendment is made for clarification purposes. The amended limitation is an inherent feature of a non-measurement cell, which is integrally formed within a transmission line.

Claim 53. Support for the amendments in Claim 53 can be found on page 19, lines 2-8. Further, resonance is only mentioned to describe what is in the prior art and is not discussed in any part of the Specification that describes the Applicant's apparatus and multiple embodiments thereof. It is clear by reading the Specification that the Applicant's apparatus and multiple embodiments thereof is not based on the condition of resonance.

Claim 62. Support for the amendment to Claim 62 can be found on page 19, line 1.

Claim 66. Support for the amendment to Claim 66 can be found in FIG. 12; page 46, line 18 though page 47, line 2; and page 52, line 19 through page 53, line 10.

Claim 76. Support for the amendment to Claim 76 can be found in FIG. 12; page 46, line 18 though page 47, line 2; and page 52, line 19 through page 53, line 10.

Claim 77 is cancelled.

Claim 81. The amendment to Claim 81 is made for clerical purposes.

X. Conclusion

It is submitted in view of these remarks that all grounds for rejection have been removed by the foregoing amendments and discussion. Reconsideration and allowance of this application are therefore earnestly solicited.

The Examiner is invited to phone Mr. Theodore Ro, attorney for Applicant, 281-244-7148, if in his opinion such a phone call would serve to expedite the prosecution of subject patent application.

Respectfully submitted,

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